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L1	radio near3 transmission and flight	575	L1

END OF SEARCH HISTORY

WEST

Generate Collection Print

L4: Entry 6 of 11 File: USPT Jul 29, 1997

DOCUMENT-IDENTIFIER: US 5652785 A
TITLE: Enhanced wide area audio response network

Assignee Name (1):
United Stated Advanced Network, Inc.

Assignee Name (Derived) (1):
United Stated Advanced Network, Inc.

Abstract Paragraph Left (1):
Apparatus and method to provide enhanced wide area audio response services through an enhanced wide area audio response network which includes a central controller and a plurality of audio peripherals distributed over a wide area, each audio peripheral being connected to telephone lines for receiving and originating telephone calls, converting received analog audio signals into digital representations, recording and storing digital representations, converting stored digital representations into analog audio signals, playing audio signals over connected telephone lines, and communicating with, including receiving commands from, the central controller over a Packet Switched Public Data Network (PSPDN), which controller is a highly reliable general purpose controller which offers utility grade service to each audio peripheral and utilizes Dialed Number Identification Service (DNIS) tables for various applications, including voice messaging, audio text, remote information provider accessing, and testing to provide error notification.

Brief Summary Paragraph Right (1):
The present invention relates generally to the field of audio response systems, and more specifically to the field of providing enhanced audio response services over a wide area network.

Brief Summary Paragraph Right (4):
IVR's are used in many different applications, including telephone banking, order entry, automatic call routing. IVR's often enable telephones to serve as "terminals" to host computers. Live operators are often incorporated to assist callers using rotary phones and callers who refuse to interact with machines. One example of an IVR is disclosed in U.S. Pat. No. 4,908,850. That patent shows a local network of independent IVR's which work in conjunction with live operators. IVR's are typically connected to Private Branch Exchanges (PBX's) or exist as stand alone systems in single locations.

Brief Summary Paragraph Right (11):
Briefly described, the object of this invention is to provide an enhanced wide area audio response network which satisfies the above stated needs. The present invention offers audio response services through a unique wide area network of Audio Response Nodes (ARN's) which are controlled by an Audio Response Node (ARN) manager. The system is potentially capable of offering a wide range of audio response services to a large number of users efficiently and cost effectively.

Brief Summary Paragraph Right (13):
Each ARN communicates with the ARN manager through a network. The preferred network is the Packet Switched Public Data Network (PSPDN) using the X.25 protocol. Alternately, other networks including conventional leased lines are also acceptable. Packet Assembler/Disassemblers (PAD's) are connected to each ARU because they are not capable of operating in the packet mode, unlike the ARN manager which is capable

of operating in the packet mode. Data Circuit-terminating Equipment (DCE), often in the form of MODEM's (MODulator/DEModulator), is used to connect the PAD's and the ARN manager to the PSPDN.

Brief Summary Paragraph Right (16):
The ARN manager is also capable of interfacing with remote information provider databases through various network links, including the PSPDN, leased lines, and switched lines, using any of a variety of communication protocols, including X.25, 3270, LU2, LU6.2, Asynchronous, and Bisynchronous. The system is therefore able to simultaneously provide many telephone callers with interfaces to various remote databases. In this way, the system can provide access to many diverse services as a result of dialing one telephone number.

Brief Summary Paragraph Right (19):
Other audio response services offered by the present invention include, but are not limited to, college registration services, banking or credit card balance information, check guarantees, credit card verification, catalog ordering, cash register receipt reporting, stock market information, business news, sports news, weather news, and airline flight information.

Brief Summary Paragraph Right (22):
Yet another object of the present invention is to provide an audio response system which includes a plurality of audio response nodes remotely distributed over a wide area network and controlled by a central controller wherein all call control programs are stored and executed by the central controller.

Brief Summary Paragraph Right (24):
Still another object of the present invention is to provide a wide area audio response system which includes audio response nodes which include digital storage media, conversion devices for converting analog signals into digital representations and converting digital representations into analog signals, detecting devices connected to user telephone lines for detecting predetermined frequencies, and frequency generating devices for supplying analog signals to the connected user telephone lines.

Brief Summary Paragraph Right (28):
Still another object of the present invention is to provide a method of providing a wide area audio response system which receives caller information at a plurality of audio peripheral nodes, transfers the information to a central controller, processes the information at the central controller, transfers control commands to the audio response nodes, and supplies the caller with analog audio signals converted from stored digital representations of the analog audio signals.

Detailed Description Paragraph Right (1):
Referring now in greater detail to the drawings in which like numerals represent like components throughout the several figures, the preferred embodiment will now be described. References to components not appearing in figures being described and not otherwise noted are understood to refer to FIGS. 1 or 2. FIG. 1 shows a block diagram representation of the preferred embodiment of the enhanced wide area audio response network 10. User telephones 11a and 11b are connected to Local Exchange Carrier (LEC) Central Office's (CO's) 12a and 12b. (The letters "a" and "b" are used to indicate similar elements and suggest a plurality of the elements; therefore, the letters will henceforth in large part be disregarded in this description) A very large number of telephone stations are typically serviced by LEC CO 12. Live operator bank 18 is also connected to LEC CO 12. Access tandem 13 connects LEC CO 12 to long Distance Carrier (LDC) Point of Presence (POP) 14. LEC CO 12 and access tandem 13 represent the telecommunications link necessary to deliver signals from user telephone 11 & live operator bank 18 to LDC POP 14. Other LEC CO's or local tandems may be interconnected between LEC CO 12 and access tandem 13 as is known in the industry.

Detailed Description Paragraph Right (2):
Within LDC POP 14 is LDC switch 15 connected through T1 lines to Audio Response Node (ARN) 20. Data Circuit-terminating Equipment (DCE) 17 is seen connecting ARN 20 to Packet Switched Public Data Network (PSPDN) 16 over an X.25 link. DCE 41 connects

Audio Response Node (ARN) manager 39, which is located within central controller 40 and connected to Audio Response Unit (ARU) 46, to PSPDN 16. DCE 62 connects information provider 60, which is connected to database 61, to PSPDN 16. ARU 46 is seen connected to LEC CO 42 which is connected to support personnel telephone 43 and paging service 44. Beeper 45 is connected to paging service 44 through Radio Frequency (RF) waves, as is indicated in FIG. 1.

Detailed Description Paragraph Right (7):
Referring in more detail to FIG. 1, user telephone station 11 is seen connected to Local Exchange Carrier Central Office (LEC CO) 12. User telephone 11 can be any of a large variety of currently known telephone stations, including, but not limited to, rotary, Dual Tone Multi-Frequency (DTMF), private telephone stations, radio telephone stations, public pay telephone stations, smart telephone stations, and Private Branch Exchange (PBX) stations. Live operator bank 18 is also seen connected to LEC CO 12 and includes one or more live operators who remain ready to assist callers. All methods through which signals travel from user telephone 11 and live operator bank 18 to LDC POP 14 are considered covered by the scope of the present invention. A large network of LEC CO's, including end CO's, local tandems, (not shown) and mobile telephone switch offices (not shown) may be encountered before an access tandem 13 is found. LEC's are understood to include, but are not limited to, Regional Bell Operating Companies (RBOC's) and the Independent Telephone Companies (ITC's). The technical nature of CO's are considered understood by those skilled in the art of telephony.

Detailed Description Paragraph Right (13):
TIS 29 provides several related functions. All forty-eight analog channels terminate at TIS 29. TIS 29 is capable of detecting and producing on each channel Multi-Frequency (MF) signals, Dual Tone Multi-Frequency (DTMF) signals, and E&M signals (including -48 volts and ground). Analog audio signals are received on each receive pair and converted to digital representations by TIS 29 and delivered to peripheral processor 25, which then, after temporarily storing the digital representations in Random Access Memory (RAM), supplies the digital representations to disk controller 26 to be stored on disk 27. Conversely, peripheral processor 25 reads digital representations of audio analog signals from disk 27 through disk controller 26 and supplies those digital representations to TIS 29 which converts them to analog audio signals and supplies them to a transmit pair. The method through which these conversions take place is considered understood in the art.

Detailed Description Paragraph Right (15):
PAD 23 is necessary for a non-packet node device to communicate in PSPDN 16. A PAD is a device which speaks to a non-packet mode device using the native protocol of the device, which might be asynchronous, bisynchronous, or any other protocol, and converts the data stream into X.25 protocol for communication with the network DCE. In this application, the network DCE is a MODEM represented as DCE 17. The details and advantages of the PSPDN 16 are considered to be well understood by those ordinarily skilled in the art. Also, as previously stated, other communication networks, including leased lines, are considered within the scope of the present invention.

Detailed Description Paragraph Right (30):
If the digits are valid, MA commands ARU 21 to play the "Please record your name" prompt and to begin recording for 10 seconds. ARU server 72 is also instructed to set a response timer for a confirmation from ARU 21. If a name is not spoken, no confirmation is received, and similar Error "Try Again" or End Routines are executed. If a name was spoken and recorded, ARU 21 converts the analog audio signals into digital representation of the analog audio signals and stores the data on disk 27 through disk controller 26. ARU 21 then transmits a confirmation in the form of the address of the stored message to ARU server 72. MA stores the address after receiving it from ARU server 72 and then commands ARU 21 to play the "Please record your one minute message" prompt and to begin recording for 1 minute. ARU server 72 is also again instructed to set another confirmation tinier. As before, if no message is recorded, the Error "Try Again" or End routines are executed. If a message is recorded, ARU 21 again saves the message and transmits the address of the saved file. MA again saves the address and then commands ARU 21 to play the "Thank you" prompt and to disconnect the caller to free the line. ARU 21 complies, and the

call is ended.

Detailed Description Paragraph Right (35):
Other audio response services include banking and credit card information services. ARN manager 39 could receive nightly batched information from the bank or credit card company computer (information provider 60). A customer could receive balance information over the telephone. Check guarantee services could also be provided wherein a caller maintains a business and needs to verify that one of his customer's checks is valid. Catalog ordering services are obviously adaptable to this system. Stock market information, business news, sports news, weather news, and airline flight information are all examples of volatile information categories maintained on information provider databases 61. ARN manager 39 can also provide an interface to several information providers 60 to provide a gateway to a variety of information.

Other Reference Publication (2):
Second IEEE Nat'l Conference on Telecomm.--P.P. Cretch, A.R. Allwood E.S.P. Allard--"A Network For Recorded Info. Dist."Apr. 1989--pp. 10-14.

Other Reference Publication (4):
"Customer Control of Network Services", G.A. Boack, E.G. Sable, R.J. Stewart Oct. 1984--vol. 22 No. 10 IEEE Comm. Mag. pp. 8-14.

CLAIMS:

1. Method of providing voice messaging services to callers from a wide area network system, the method comprising the steps of:

receiving a call from a caller through a communication channel at a first audio peripheral of a plurality of locationally diverse audio peripherals connected to a plurality of communication channels and to a central controller through a network;

in response to control signals received from the central controller, reproducing to the caller audio prompts from digital representations of the audio prompts stored in a storage device of the first audio peripheral;

in response to the reproduced audio prompts, receiving from the caller a caller audio message and a destination number associated with a message recipient;

converting the caller audio message and the destination number into a digital representation of the caller audio message and destination number;

storing the digital representation of the caller audio message and destination number at a location in a storage device of the first audio peripheral;

associating an address with the location of the digital representation of the caller audio message and destination number;

transferring the address of the location of the digital representation of the caller audio message and destination number from the first audio peripheral to the central controller; and

reproducing to the message recipient the caller audio message from a digital representation of the caller audio message.

6. The method of claim 5, wherein the step of reproducing to the message recipient, further includes, at least, the steps of

using an address associated with a location of a digital representation of the caller audio message and destination number, retrieving at an audio peripheral a digital representation of the caller audio message,

converting at an audio peripheral the digital representation of the caller audio message into a plurality of analog signals, and

transmitting from an audio peripheral the plurality of analog signals through a

communication channel to the message recipient.

16. The method of claim 15, wherein the step of reproducing to the message recipient further includes, at least, the steps of

using the address of the location of the digital representation of the caller audio message and destination number in the second audio peripheral, retrieving the digital representation of the destination number from the storage device in the second audio peripheral of the plurality of audio peripherals,

converting at the second audio peripheral the digital representation of the destination number into audio signals representative of the destination number, and

transmitting from the second audio peripheral the audio signals through a communication channel connected to the second audio peripheral.

17. The method of claim 15, wherein the step of reproducing to the message recipient further includes, at least, the steps of

using the address of the location of the digital representation of the caller audio message and destination number in the second audio peripheral, retrieving the digital representation of the caller audio message from the storage device in the second audio peripheral of the plurality of audio peripherals,

converting at the second audio peripheral the digital representation of the caller audio message into audio signals representative of the caller audio message, and

transmitting from the second audio peripheral the audio signals through a communication channel connected to the second audio peripheral.

19. Method of providing wide area audio response services to callers from a wide area audio response network system, said method comprising the steps of:

storing at a central controller a plurality of instructions necessary to implement an audio response service;

receiving an incoming call on a telephone line at an audio peripheral of a plurality of peripherals from a user in response to the user dialing a telephone number associated with the audio response service, each of the audio peripherals having recording means for recording messages for callers;

associating at the audio peripheral a line reference number which identifies the telephone line which received the incoming call;

notifying the central controller from the audio peripheral through a network connecting the central controller and the audio peripheral that the incoming call has been received by the audio peripheral;

retrieving at the central controller the plurality of instructions stored at the central controller;

converting at the central controller the plurality of instructions into a plurality of commands executable by the audio peripheral;

incorporating at the central controller the line reference number with each command of the plurality of commands;

transferring the plurality of commands and the incorporated line reference number from the central controller to the audio peripheral; and

executing the plurality of commands at the audio peripheral.

26. An audio response system comprising:

an audio peripheral means connected to a communication channel for receiving input

analog audio signals supplied through said communication channel, for converting said input analog audio signals into digital representations of said input analog audio signals, for storing said digital representations of said input analog audio signals at a storage location having an address, and for associating a channel reference with said digital representations, said channel reference identifying said communication channel;

a central controller means connected to said audio peripheral means for controlling the operation of said audio peripheral means, for storing a plurality of instructions associated with a plurality of audio response services, for converting each instruction of said plurality of instructions into at least one command executable by said audio peripheral means, for associating an audio peripheral reference with said command, said audio peripheral reference identifying said audio peripheral means, and for transferring said command to said audio peripheral means;

wherein said audio peripheral means includes, at least, means for receiving said command from said central controller means, means for executing said command, means for generating a response to said command, and means for transferring said response to said central controller means;

wherein said response includes, at least, said channel reference associated with said communication channel; and

wherein said command includes, at least, said audio peripheral reference associated with said audio peripheral means,

whereby the central controller means directs operation of the audio peripheral means through the issuance of commands and receipt of responses to provide an audio response service of the plurality of audio response services.

39. The system of claim 26, wherein said audio peripheral means further includes, at least,

means for storing digital representations of output analog audio signals, each said digital representation being stored at a storage location having an address,

means for converting said digital representations of output analog audio signals into reproduced output analog audio signals, and

means for communicating said reproduced output analog audio signals to said communication channel.

42. The system of claim 26, further includes, at least, a network means for connecting said audio peripheral means to said central controller means, whereby the audio peripheral means receives commands from the central controller through the network means and the audio peripheral means sends responses to the central controller means through the network means.

45. Method of providing wide area audio response services to callers from a wide area audio response network system, said method comprising the steps of:

storing at a central controller a plurality of instructions necessary to implement an audio response service;

receiving an incoming call at an audio peripheral from a user in response to the user dialing a telephone number associated with the audio response service;

notifying the central controller from the audio peripheral through a network connecting the central controller and the audio peripheral that the incoming call has been received by the audio peripheral;

retrieving at the central controller an instruction from the plurality of instructions stored at the central controller;

converting at the central controller the instruction retrieved from the plurality of

instructions into at least one command executable by the audio peripheral;

transferring the command from the central controller to the audio peripheral; and

executing the command at the audio peripheral;

wherein the command executed at the audio peripheral is a member selected from a group of commands consisting of (i) answer a telephone call, (ii) record analog audio input from a telephone call, (iii) hang-up a telephone call, (iv) initialize a telephone call, and (v) play a particular message from a plurality of messages stored at the audio peripheral.

46. Method of providing wide area audio response services to callers from a wide area audio response network system, said method comprising the steps of:

storing at a central controller a plurality of instructions necessary to implement an audio response service;

receiving an incoming call at an audio peripheral from a user in response to the user dialing a telephone number associated with the audio response service;

notifying the central controller from the audio peripheral through a network connecting the central controller and the audio peripheral that the incoming call has been received by the audio peripheral;

retrieving at the central controller an instruction from the plurality of instructions stored at the central controller;

converting at the central controller the instruction retrieved from the plurality of instructions into at least one command executable by the audio peripheral;

transferring the command from the central controller to the audio peripheral;

executing the command at the audio peripheral;

generating at the audio peripheral a response to the command executed at the audio peripheral; and

transmitting the response from the audio peripheral to the central controller;

wherein the response generated at the audio peripheral is a member selected from a group of responses consisting of (i) caller hung up, (ii) dialing complete, (iii) telephone line answered, (iv) recording stopped on silence, and (v) an address of a stored message.

47. Method of providing wide area audio response services to callers from a wide area audio response network system, said method comprising the steps of:

storing at a central controller a plurality of instructions necessary to implement an audio response service;

associating timing information with an instruction of the plurality of instructions;

storing the timing information at the central controller in association with the instruction;

receiving an incoming call at an audio peripheral from a user in response to the user dialing a telephone number associated with the audio response service:

notifying the central controller from the audio peripheral through a network connecting the central controller and the audio peripheral that the incoming call has been received by the audio peripheral;

retrieving at the central controller the instruction from the plurality of

instructions stored at the central controller;

retrieving at the central controller the timing information associated with the instruction;

converting at the central controller the instruction retrieved from the plurality of instructions into at least one command executable by the audio peripheral;

transferring the command from the central controller to the audio peripheral;

tracking at the central controller an amount of time elapsed since transferring the command from the central controller to the audio peripheral; and

comparing at the central controller the timing information and the amount of time elapsed to detect a time out condition.

48. Method of providing wide area audio response services to callers from a wide area audio response network system, said method comprising the steps of:

storing at a central controller a plurality of instructions necessary to implement an audio response service;

associating a number of expected response digits with an instruction of the plurality of instructions;

storing the number of expected response digits at the central controller in association with the instruction;

receiving an incoming call at an audio peripheral from a user in response to the user dialing a telephone number associated with the audio response service;

notifying the central controller from the audio peripheral through a network connecting the central controller and the audio peripheral that the incoming call has been received by the audio peripheral;

retrieving at the central controller the instruction from the plurality of instructions stored at the central controller;

retrieving at the central controller the number of expected response digits associated with the instruction;

converting at the central controller the instruction retrieved from the plurality of instructions into at least one command executable by the audio peripheral;

transferring the command from the central controller to the audio peripheral;

executing the command at the audio peripheral;

receiving at the central controller at least one digit from the audio peripheral in response to the step of executing the command at the audio peripheral;

counting at the central controller a number of digits received since the step of transferring the command from the central controller to the audio peripheral; and

comparing at the central controller the number of expected response digits and the number of digits received from the audio peripheral to detect an error condition.

49. Method of providing wide area audio response services to callers from a wide area audio response network system, said method comprising the steps of:

storing at a central controller a plurality of instructions necessary to implement an audio response service;

storing at the central controller a list of valid telephone numbers;

receiving an incoming call at an audio peripheral from a user in response to the user dialing a telephone number associated with the audio response service;

notifying the central controller from the audio peripheral through a network connecting the central controller and the audio peripheral that the incoming call has been received by the audio peripheral;

retrieving at the central controller an instruction from the plurality of instructions stored at the central controller;

converting at the central controller the instruction retrieved from the plurality of instructions into at least one command executable by the audio peripheral;

transferring the command from the central controller to the audio peripheral;

executing the command at the audio peripheral;

in response to the command executed at the audio peripheral, receiving at the central controller from the audio peripheral a telephone number associated with a telephone accessible by a party with whom the user wishes to communicate; and

comparing the telephone number with the list of valid telephone numbers to determine whether or not the telephone number is a valid telephone number.

50. Method of providing wide area audio response services to callers from a wide area audio response network system, said method comprising the steps of:

storing at a central controller a plurality of instructions necessary to implement an audio response service;

storing at the central controller a list of valid telephone numbers;

associating a time zone with a particular telephone number of the list of valid telephone numbers;

storing at the central controller the time zone associated with the particular telephone number;

receiving an incoming call at an audio peripheral from a user in response to the user dialing a telephone number associated with the audio response service;

notifying the central controller from the audio peripheral through a network connecting the central controller and the audio peripheral that the incoming call has been received by the audio peripheral;

retrieving at the central controller an instruction from the plurality of instructions stored at the central controller;

converting at the central controller the instruction retrieved from the plurality of instructions into at least one command executable by the audio peripheral;

transferring the command from the central controller to the audio peripheral;

executing the command at the audio peripheral;

in response to the command executed at the audio peripheral, receiving at the central controller from the audio peripheral the particular telephone number which is associated with a telephone accessible by a party with whom the user wishes to communicate; and

accessing the list of valid telephone numbers to determine the time zone associated with the particular telephone number.

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L2: Entry 1 of 45 File: USPT Jun 18, 2002

US-PAT-NO: 6408180
DOCUMENT-IDENTIFIER: US 6408180 B1

TITLE: Ubiquitous mobile subscriber station

DATE-ISSUED: June 18, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
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Gregoire; Scott P.	Louisville	CO		
Polson; Jerry H.	Longmont	CO		

ASSIGNEE-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY	TYPE CODE
AirCell, Inc.	Louisville	CO			02

APPL-NO: 9/ 379825 [PALM]
DATE FILED: August 24, 1999

PARENT-CASE:
CROSS-REFERENCE TO RELATED APPLICATIONS This application is a continuation in part of U.S. patent application Ser. No. 08/960,183, filed Oct. 22, 1997 and titled "Non-terrestrial Cellular Mobile Telecommunication Station", which is a continuation-in-part of U.S. patent application Ser. No. 08/027,333 filed Mar. 08, 1993 of U.S. Pat. No. 5,444,762, titled "Method and Apparatus for Reducing Interference Among Cellular Telephone Signals" and U.S. patent application Ser. No. 07/847,920 filed on Mar. 06, 1992, U.S. Pat. No. 5,557,656, titled "Mobile Telecommunications".

INT-CL: [7] H04 Q 7/20

US-CL-ISSUED: 455/431; 455/430, 455/456, 455/552, 455/562, 455/440
US-CL-CURRENT: 455/431; 455/430, 455/440, 455/456, 455/552, 455/562

FIELD-OF-SEARCH: 455/431, 455/430, 455/427, 455/428, 455/562, 455/456, 455/436, 455/12.1, 455/440, 455/63, 455/447, 455/552, 455/553

PRIOR-ART-DISCLOSED:

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Search Selected Search ALL

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
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☐	5235633	August 1993	Dennison et al.	379/60
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OTHER PUBLICATIONS

G. D'Aria et al., "Terrestrial Flight Telephone System: Integration Issues for a Pan-European Network," Proceedings of the Nordic Seminar On Digital Mobile Radio Communications, Seminar 5, pp. 123-130, (Dec. 1, 1992).

ART-UNIT: 2684
PRIMARY-EXAMINER: Hunter; Daniel
ASSISTANT-EXAMINER: Le; Lana
ATTY-AGENT-FIRM: Patton Boggs LLP

ABSTRACT:

The ubiquitous mobile subscriber station of the present invention enables the subscriber to receive wireless cellular mobile telecommunication services in a unified manner in both the terrestrial (ground-based) and non-terrestrial regions. The ubiquitous mobile subscriber station extends the usage of existing cellular mobile telecommunication frequencies allocated for ground-based cellular communications to non-terrestrial cellular communications in a manner that avoids the possibility of signal interference between the ground-based and non-terrestrial mobile subscriber stations. In particular, the ubiquitous mobile subscriber station automatically transitions between the communications paradigm used in ground-based cellular communications and the communications paradigm used in non-terrestrial cellular communications as a function of the present location of the ubiquitous mobile subscriber station. The subscriber therefore can use the ubiquitous mobile subscriber station in all locations for uninterrupted wireless communications services. In addition, the non-terrestrial capabilities of the ubiquitous mobile subscriber station can be used to implement data transmission capabilities for use in the aircraft to provide Flight Information Services, real time monitoring of aircraft operation, as well as enhanced data communication services for the passengers in the aircraft.

34 Claims, 7 Drawing figures

L2: Entry 14 of 45 File: USPT Jan 23, 2001

DOCUMENT-IDENTIFIER: US 6177887 B1
TITLE: Multi-passenger vehicle catering and entertainment system

Brief Summary Paragraph Right (15):
U.S. Pat. No. 4,975,696 to Salter Jr., et al., Dec. 4, 1990, anticipates a desire to satisfy passenger queries for information about their flight, and provides the means by which flight information is presented to the passengers. This system creates a piecemeal approach to providing information, and obtaining information to a multiplicity of passengers.

Detailed Description Paragraph Right (7):
The system described is generally initiated by entry of information at several points. Audio programming information is loaded through audio program source 30. Audio source 30 may be a CD-ROM, an audio cassette player, or other type of audio storage system. Video programming information is loaded through video program source 31. Video program source 31 may be a CD-ROM, VHS cassette player, or other type of video analog or digital information storage system device. Audio program source 30 may be an audio cassette, CD-ROM, or other type of recorded audio information. This provides the audio and video program selections that will be available to the passengers during the operation of the system, or until new program source information is inputted. General computer programming, meal selections, special requests, flight information, gate information, and game selections are loaded through computer program source 32. After loading data into these three inputs, the system is prepared for operation.

Detailed Description Paragraph Right (8):
Computer 10 constantly "polls" all seats on the system for inputs. Upon receipt of an input request, computer 10 takes appropriate action. A passenger initiates an action, or input, by means of input controls 25. Initially, data formatter 22 formats alphanumeric information, and passenger view screen 35 displays the first level of menu items for passenger selection. See FIG. 2 and 3 for further explanation of menu. These are typically "Meal", "Beverage", "Entertainment", "Assistance", and "Flight Information." A passenger may press an input control "Scroll Down" to see more menu selections, "Scroll Up" to see previous menu selections, or "Enter" if the select arrow (see FIG. 3) is on the same line as a desired menu item.

Detailed Description Paragraph Right (18):
An additional selection for the passenger is "Flight Information." By selecting this choice, the passenger may access such information as progress of the current flight, estimated time of arrival, local time at destination, or connecting flight information, such as departure gate, time of departure, distance within the terminal from arriving gate, and departure gate, or other such information as will be helpful to the passenger.

Detailed Description Paragraph Right (60):
Often, there is considerable confusion on a crowded flight, or a flight to a hub city, requiring passengers to move within the airport terminal to the proper gate for connecting flights. This system significantly alleviates this confusion. During the flight, data can be transmitted to the enroute aircraft pertaining to gate information for connecting flights. This data can be loaded into this system prior to departure, or updated in flight to accommodate gate changes that may occur during the duration of the flight. This information is then available to each passenger. By

selecting a menu item entitled "Flight Information", the passenger may see up to data information, and even a map if so desired, of the necessary connecting flight's gate, and direction from the arriving gate of the current flight.

Detailed Description Paragraph Right (61):
Prior to flight, data will be loaded through computer program input 33, FIG. 1 pertaining to the current flight, and all connecting flights for passengers. As the flight nears its destination, the flight attendant can draw to the attention of all passengers that connecting flight information pertinent to their trip can be obtained on the passenger control unit at their seat. Each passenger may then access the flight information of main menu 40. Those passengers seeking such information will then see their arriving gate, their connecting flight departure gate, and if appropriate, information telling them how to get from the arriving gate to their departing gate.

CLAIMS:

3. The integrated electronic information system of claim 1 wherein said passenger seat computer provides a visual display of a menu selection selected from the class of beverages, entertainment selections, audio programs, video programs, assistance, airline flight information including connecting gate assignment information, display of real-time aircraft location, comfort, amenities, and information offered to said passenger.

7. The integrated electronic information system of claim 1 wherein said central computer enables any passenger to select from the group consisting of games and meal selection and beverage selection and flight information and arrival gate information and broadcasting a request to play a game with another passenger and a request for attendant assistance.

9. The integrated electronic information system of claim 1 wherein said central computer enables the entry of data selected from the group consisting of occupied and unoccupied seats and special passenger orders requested and connecting flights and information pertaining to specific passengers and flight information and gate information and meal selections and beverage selections and video selections and audio selections and advertising information and game selections and assistance information.

13. The integrated electronic information system of claim 1 wherein said central computer enables the reception and recording of new system data, via radio transmission, of updated system information, for example changed connecting flight gate information.

16. The integrated electronic information system of claim 1 wherein said central computer enables services selected from the group consisting of meal selection without direct attendant/passenger contact and beverage selection without direct attendant/passenger contact and passenger assistance without direct attendant/passenger contact and game selection without direct attendant/passenger contact and flight information without direct attendant/passenger contact and gate information without direct attendant/passenger contact.

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L2: Entry 17 of 45 File: USPT Oct 17, 2000

DOCUMENT-IDENTIFIER: US 6134453 A
TITLE: Adaptive omni-modal radio apparatus and methods

Abstract Paragraph Left (1):
A frequency and protocol agile wireless communication product, and chipset for forming the same, including a frequency agile transceiver, a digital interface circuit for interconnecting the radio transceiver with external devices, protocol agile operating circuit for operating the radio transceiver in accordance with one of the transmission protocols as determined by a protocol signal and an adaptive control circuit for accessing a selected wireless communication network and for generating the frequency control signal and the protocol control signal in response to a user defined criteria. Among the possible user defined criteria would be

Brief Summary Paragraph Right (1):
This invention relates generally to frequency and protocol agile, wireless communication devices and systems adapted to enable voice and/or data transmission to occur using a variety of different radio frequencies, transmission protocols and radio infrastructures.

Brief Summary Paragraph Right (6):
While multi-modal in some regard, each of the technologies disclosed in the above listed patents is highly specialized and limited to a specific application. The systems disclosed are clearly non-adaptive and are incapable of being easily reconfigured to adapt to different transmission protocols or different radio infrastructures. Recently, Motorola has announced beta testing of a system called "MoNet" which will allegedly allow users to operate on whatever wireless network happens to be available using protocol and frequency agile radio modems. The MoNet technology will be integrated in both networks and mobile devices and will permit first time users to fill out an electronic application, transmit it, and receive a personal ID to allow the user to operate on any of several mobile networks yet receive just one bill. Another provider of an open system is Racotek of Minneapolis, Minn. which offers client server architecture designed to be portable across different mobile devices, host platforms, and radio infrastructures.

Detailed Description Paragraph Right (1):
A preferred embodiment of a standardized radio processing circuit 1 is shown in FIGS. 1A and 1B. The standardized radio processing circuit 1, shown in FIGS. 1A and 1B taken together, may be implemented on a single VLSI chip or on a set of VLSI chips making up a chipset. As will be seen, this chip or chipset provides a standard building block which can be used to make a plurality of consumer products that provide data transmission capability. As will be seen later with reference to FIGS. 2 through 8, by adding minimal external components to the standardized circuit 1, a wide variety of products can be produced. Also, as will be seen, the standardized circuit 1 can be advantageously implemented on a removable card with a standardized interface connector or connectors, so that it can then be selectively inserted into and removed from a variety of devices to provide the devices with radio information transmission capability.

Detailed Description Paragraph Right (20):
Transmit mixer 8 is connected to programmable local oscillator 12 which is capable of generating frequencies that cover the frequency spectrum of the desired communication systems. Transmit mixer 8 operates in a manner well known in the art to convert the intermediate frequency signal received from switch 16 to a radio

frequency for transmission over a radio communication system. The output of transmit mixer 8 is connected to amplifier 6. Amplifier 6 acts to amplify the signal to insure adequate strength for the signal to be transmitted to the remote receiving station. Amplifier 6 may be connected to control circuitry to allow the power output of amplifier 6 to be varied in accordance with control signals received from the control circuitry. The output of amplifier 6 is connected to diplexer 4 and, as described above, to antenna 2.

Detailed Description Paragraph Right (39):
FIGS. 4A and 4B depict a communication device 402 employing the omni-modal circuit 1 of the present invention, and having an integrated display device for conveying information to a user. FIG. 4A shows the front of the communication device 402 that could serve as a cellular phone. The device 402 includes speaker 100, antenna 2, microphone 102 and key pad buttons 406. In this regard, the external features of the device are similar to those of a standard commercially available cellular phone. As shown in FIG. 4B, the device is unique in that it incorporates an expanded display 404 and control buttons 408, 410, 412 for the display of information to the user. For example, the display 404 could convey airline flight information to the user while they are connected with an airline representative. In response to a user request, the airline representative could transmit flight information to the user's communication device 402, which would then display this information on the display 404. The user could then cycle through the information using increment button 408 and decrement button 410. When the user desired to select a given flight, they could indicate assent by pressing the enter button 412. This information would then be transmitted digitally to the airline representative's computer.

Detailed Description Paragraph Right (51):
Therefore, the radio communications card 701 serves as a modem to the personal computer and a separate modem card or external modem is not necessary in order to transmit data over a landline jack. The microprocessor 110 in the omni-modal circuit card 701 allows the circuitry to select either landline transmission via external RJ-11 jack 712 or cellular radio transmission through antennae 2. This may be accomplished for example through an analog switch circuit as disclosed in U.S. Pat. No. 4,972,457, the disclosure of which is incorporated herein by reference.

CLAIMS:

3. The multi-modal device of claim 1, wherein said adaptive control control circuit selects the wireless communication network based on the quality of the radio transmission link connecting said frequency agile transceiver and the selected wireless communication network.

5. The multi-modal device as defined in claim 1, wherein said adaptive control means selects the wireless communication network based on the security of the radio transmission link connecting said frequency agile transceiver and the selected wireless communication network.

7. The multi-modal device as defined in claim 1, wherein said adaptive control circuit selects the wireless communication network based on the combined determination of two or more of the following:

the cost of using the wireless communication network;

the quality of the transmission link connecting said frequency agile transceiver and the selected wireless communication network;

prior experience with specific wireless communication networks;

the potential for being dropped by the network; and

the security of the radio transmission link connecting said frequency agile transceiver and the selected wireless communication network.

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L2: Entry 18 of 45 File: USPT Oct 10, 2000

US-PAT-NO: 6131065
DOCUMENT-IDENTIFIER: US 6131065 A

TITLE: Electronic flight data strips and method for air traffic control

DATE-ISSUED: October 10, 2000

INVENTOR-INFORMATION:

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APPL-NO: 9/ 030126 [PALM]
DATE FILED: February 25, 1998

INT-CL: [7] G06 G 7/70, G06 G 7/76, G06 F 19/00

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US-CL-CURRENT: 701/120; 244/1R, 244/189, 342/36, 701/14, 702/144

FIELD-OF-SEARCH: 701/120, 701/14, 244/189, 244/1R, 342/36, 702/144

PRIOR-ART-DISCLOSED:

U.S. PATENT DOCUMENTS

Search Selected Search ALL

	PAT-NO	ISSUE-DATE	PATENTEE-NAME	US-CL
☐	4005388	January 1977	Morley et al.	
☐	4298793	November 1981	Melis et al.	
☐	4672759	June 1987	Docherty et al.	
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☐	5606344	February 1997	Blaskey et al.	
☐	5659475	August 1997	Brown	
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86/02750	May 1986	WOX	

OTHER PUBLICATIONS

Aviation Week & Space Technology, Feb. 2, 1998, pp. 42-63.

ART-UNIT: 361
PRIMARY-EXAMINER: Cuchlinski, Jr.; William A.
ASSISTANT-EXAMINER: Hernandez; Olga
ATTY-AGENT-FIRM: de Angeli; Michael

ABSTRACT:

A portable, re-usable, battery-powered, electronic device for storing, displaying and modifying air traffic control information. The electronic flight data strip receives input data from an external data source via infrared or radio transmission, stores the data in an on-board memory device, displays selected portions of the received data for viewing by an air traffic controller, and receives and displays inputs from the air traffic controller either directly through integral switches or via aforesaid communications channels. All input and output data messages and air traffic controller commands may be stored and time tagged for later retrieval. The contents of the stored memory can also be interrogated and modified by external data processing devices. Following completion of the flight, the contents of the internal memory can be interrogated for the purpose of archiving or investigation and/or cleared for subsequent re-use on another flight.

15 Claims, 5 Drawing figures

L2: Entry 41 of 45 File: USPT Sep 28, 1982

DOCUMENT-IDENTIFIER: US 4352200 A
TITLE: Wireless aircraft passenger audio entertainment system

Abstract Paragraph Left (1):
Audio information in several audio channels is supplied via head sets to passengers seated aboard an aircraft in rows of seats including armrests and being distributed along an elongate passenger section inside a metallic fuselage. According to the subject invention, an antenna is run along the elongate passenger section of the aircraft for radio transmission inside such elongate passenger section. Individual antennas are provided for the passenger seats for receiving the latter radio transmission. These receiving antennas are distributed among predetermined armrests of the passenger seats. The audio information to be transmitted is provided in radio frequency channels in a band between 72 and 73 MHz. The distributed receiving antennas are coupled via seated passengers to the transmitting antenna. The radio frequency channels are transmitted in the mentioned band via the transmitting antenna, seated passengers and distributed receiving antennas to the predetermined armrests. Audio information is derived in the audio channels from the transmitted radio frequency channels also in the predetermined armrests. Passengers are individually enabled to select audio information from among the derived audio information in the audio channels. The selected audio information is applied individually to the headsets.

Brief Summary Paragraph Right (4):
In contemporary airline traffic, passengers are supplied with audio information for several reasons, including the communication of safety instructions, flight information and news and the provision of audio entertainment and sound accompaniment for motion pictures or video programs displayed during the flight. In practice, such audio information is distributed among the airline passengers in different channels for individual reception via headsets, so that passengers are enabled to effect selections among different music or other audio presentations, or to receive the audio accompaniment of a motion picture or video presentation they may be viewing, or to choose to be undisturbed by any of the audio information received by other passengers.

Brief Summary Paragraph Right (30):
From one aspect thereof, the subject invention resides in a method of supplying audio information in several audio channels via headsets to passengers seated aboard an aircraft in rows of seats including armrests and being distributed along an elongate passenger section inside a metallic fuselage. The method according to this aspect of the invention comprises in combination the steps of running a transmitting antenna along the passenger section of the aircraft for radio transmission inside such elongate passenger section in a frequency range including at least a band between 72 and 73 MHz, providing individual antennas for the seats for receiving the radio transmission and distributing such receiving antennas among predetermined armrests of the seats, providing the audio information in radio frequency channels in said band between 72 and 73 Mhz, coupling the distributed receiving antennas via seated passengers to the transmitting antenna, transmitting the radio frequency channels in the band via the transmitting antenna, seated passengers and distributed receiving antennas to the predetermined armrests, deriving the audio information in the audio channels from the transmitted radio frequency channels in the predetermined armrests, individually enabling passengers to select audio information from among audio channels containing the derived audio information, and applying the selected audio information individually to the heatsets.

Drawing Description Paragraph Right (7):
FIG. 8 is a circuit diagram of a combiner for applying different radio frequency channels to the transmission antenna according to a preferred embodiment of the subject invention; and

Detailed Description Paragraph Right (2):
According to the subject invention an antenna 16 is run along the elongate passenger section 14 for radio transmission inside such elongate passenger section in a frequency range including at least a band between 72 and 73 MHz. By way of example, the antenna 16 may be composed of a twin lead. In a prototype system according to a preferred embodiment of the subject invention, a 300.OMEGA. television twin cable was employed for the antenna 16 with a 300.OMEGA. termination 17 at the end thereof. As seen in FIG. 1, the transmitting antenna 16 is run or extends from a transmitter 18 to the antenna termination 17 along the elongate passenger section 14 of the aircraft.

CLAIMS:

1. A method of supplying audio information in several audio channels via headsets to passengers seated aboard an aircraft in rows of seats including armrests and being distributed along an elongate passenger section inside a metallic fuselage, comprising in combination the steps of:

running a transmitting antenna along the passenger section of said aircraft for radio transmission inside such elongate passenger section in a frequency range including at least a band between 72 and 73 MHz;

providing individual antennas for said seats for receiving said radio transmission and distributing such receiving antennas among predetermined armrests of said seats;

providing said audio information in radio frequency channels in said band between 72 and 73 MHz;

coupling said distributed receiving antennas via seated passengers to said transmitting antenna;

transmitting said radio frequency channels in said band via said transmitting antenna, seated passengers and distributed receiving antennas to said predetermined armrests;

deriving said audio information in said audio channels from said transmitted radio frequency channels in said predetermined armrests;

individually enabling passengers to select audio information from among audio channels containing said derived audio information; and

applying said selected audio information individually to said headsets.

21. A method of supplying audio information in several audio channels via headsets to passengers seated aboard an aircraft in rows of seats including armrests and being distributed along an elongate passenger section inside a metallic fuselage, comprising in combination the steps of:

running a transmitting antenna from a transmitter to an antenna termination along the passenger section of said aircraft for radio transmission inside such elongate passenger section in a frequency range including at least a band between 72 and 73 MHz;

providing individual antennas for said seats for receiving said radio transmission and distributing such receiving antennas among predetermined armrests of said seats;

providing said audio information in radio frequency channels in said band between 72

and 73 MHz;

coupling said distributed receiving antennas via seated passengers to said transmitting antenna;

transmitting said radio frequency channels in said band with said transmitter via said transmitting antenna, seated passengers and distributed receiving antennas to said predetermined armrests;

deriving said audio information in said audio channels from said transmitted radio frequency channels in said predetermined armrests;

individually enabling passengers to select audio information from among audio channels containing said derived audio information; and

applying said selected audio information individually to said headsets.

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L4: Entry 2 of 11 File: USPT Oct 26, 1999

DOCUMENT-IDENTIFIER: US 5973722 A
TITLE: Combined digital audio/video on demand and broadcast distribution system

Abstract Paragraph Left (1):
An in-flight passenger entertainment system has a first digital network for communication among components of a headend system including a data server, media controller, one or more media servers, system interface unit, system manager unit and attendant control panel. The in-flight entertainment system is coupled to an aircraft's existing systems through the system interface unit and the system manager unit. The components of the headend system are all coupled to a network switch for routing data within the first network. The network switch is also coupled to one or more zone bridge units, each of which is coupled to multiple seat electronics units. The zone bridge units and the seat electronics units together form a second digital network. The first digital network is preferably an ATM network with fibre optic cables used to carry the data. The second digital network is preferably an IEEE 1394 serial bus network. The zone bridge units control all communications between the networks, converting all communications into the format required by the respective network. A first audio path for transmitting audio content from the headend system is routed to predetermined seat entertainment units through the network switch and the zone bridge units. A second audio path for transmitting audio from the system interface unit is routed to the seat entertainment units through the zone bridge units.

Brief Summary Paragraph Right (1):
The present invention relates to the field of audio and video on demand entertainment systems. More particularly, the present invention relates to the field of distributed network video on demand entertainment and broadcast distribution systems for use onboard an aircraft during flight.

Brief Summary Paragraph Right (6):
Another video on demand in-flight entertainment system has been developed by B/E Aerospace of Irvine, Calif. This system is advertised to provide a passenger with over 500 channels for regular video programming such as movies, as well as live broadcast television and a variety of interactive features such as video games. This system also provides duty free and catalog shopping, information menus, and both ground-base and satellite in-cabin telephone distribution through an individual video on demand module at the passenger's seat. The control electronics for this system are installed in a former galley unit on the aircraft which has been retrofitted to house the video on demand system. The control electronics are then coupled to each individual video on demand module throughout the cabin by a star network, with separate data wires running between each individual module and the control electronics.

Brief Summary Paragraph Right (8):
What is needed is a video on demand in-flight entertainment system which is fully interactive and can provide multiple features to a passenger through an individual module. What is further needed is a video on demand in-flight entertainment system which uses complete end-to-end digital delivery from the control system to the passenger seat units and also includes an overhead broadcast system. What is still further needed is a video on demand in-flight entertainment system which provides all entertainment features on demand to all passengers having access to a passenger seat unit at all authorized times. Additionally, what is needed is an in-flight entertainment system which incorporates a serial network and is therefore lighter,

easier to maintain and easier to reconfigure than existing systems. What is also needed is an in-flight entertainment system which includes separate and redundant systems allowing a portion of the system to fail without rendering the entire system nonoperational.

Brief Summary Paragraph Right (9):
An in-flight passenger entertainment system has a first digital network for communication among components of a headend system including a data server, media controller, one or more media servers, system interface unit, system manager unit and attendant control panel. The in-flight entertainment system is coupled to an aircraft's existing systems through the system interface unit and the system manager unit. The components of the headend system are all coupled to a network switch for routing data within the first network. The network switch is also coupled to one or more zone bridge units, each of which is coupled to multiple seat electronics units. The zone bridge units and the seat electronics units together form a second digital network. The first digital network is preferably an ATM network with fibre optic cables used to carry the data. The second digital network is preferably an IEEE 1394 serial bus network. The zone bridge units control all communications between the networks, converting all communications into the format required by the respective network. All communications across the networks are transmitted as digital data and when necessary are converted to analog signals at the seat electronics units. Through passenger control sets coupled to the seat electronics units, a passenger has access to audio and video on demand, video games, gambling, telephone service and information services. A passenger also has the ability to fast forward, rewind and pause a video feature. An overhead audio and video distribution system is used to provide audio and video content as a backup to the video on demand system or as an alternative subsystem in zones of the aircraft in which there are passenger control sets with less than full capability. A first audio path for transmitting audio content from the headend system is routed to predetermined seat entertainment units through the network switch and the zone bridge units. A second audio path for transmitting audio from the system interface unit is routed to the seat entertainment units through the zone bridge units.

Detailed Description Paragraph Right (1):
An in-flight entertainment system includes a headend system having a data server, a media controller, one or more media servers, a system interface unit, a system manager unit and an attendant control panel. The components of the headend system are coupled together for communications by a digital ATM network. Preferably, fibre optic cables are used to form the ATM network. The components of the headend system are all coupled, through the ATM network, to an ATM network switch, for routing data within the network. The network switch is also coupled to one or more zone bridge units. Each of the zone bridge units is coupled to multiple seat electronics units. Each seat electronics unit is coupled to control one or more passenger control sets through which passengers on the aircraft access the in-flight entertainment system of the present invention. The zone bridge units and the multiple seat electronics units are coupled together by an IEEE 1394 serial bus network. All communications across both of the networks are transmitted as digital data and when necessary, are converted to analog signals at the seat electronics units.

Detailed Description Paragraph Right (2):
The in-flight entertanment system is coupled to the aircraft's existing systems through the system interface unit and the system manager unit. An overhead audio and video distribution system, controlled by the system interface unit, is used to provide audio and video content as a backup to the ATM/1394 network and as an alternate subsystem in zones of the aircraft in which there are passenger control sets with less than full capability. Audio and video content data for use at the seat electronics units is stored and delivered from the media servers. When requested by a passenger, this audio and video content data is transmitted from the media servers, over the ATM network to the appropriate zone bridge unit. This transmission is controlled by the media controller at the headend of the system. From the zone bridge unit, the data is then transmitted over the IEEE 1394 serial bus to the appropriate seat electronics unit. Through each passenger control set of seat peripherals, a passenger has access to audio and video on demand, video games, gambling, telephone service and information services, such as the airline's flight schedule. When utilizing the video on demand features, a passenger also has the

ability to fast forward, rewind and pause a video feature.

Detailed Description Paragraph Right (4):
Dual audio distribution paths are maintained from the headend system to the seat electronics units. A first audio distribution path is routed from the headend servers through the ATM network switch to the zone bridge units. From the zone bridge units, the first audio path is then distributed to the seat electronics units. The first audio distribution path is used for the distribution of audio content from the media servers. A second audio distribution path is routed from the system interface unit to the zone bridge units and then to the seat electronics units. The second audio distribution path is used for the distribution of audio for public address announcements and for overhead entertainment audio. The second audio distribution path is provided to all of the seat electronics units. The first audio distribution path is provided to seat electronics units within selected zones where the audio and video on demand features of the in-flight entertainment system are available. As will be described below, an alternate embodiment of the present invention also allows a subsystem to be implemented with only the second audio distribution path. This subsystem can then be upgraded to include the first audio distribution path in those zones of the aircraft including video on demand features.

Detailed Description Paragraph Right (7):
Each of the media servers includes one or more hard disk drives and stores data to support the video on demand and audio on demand features of the system, including data representing feature films and audio content. The number of media servers necessary is dependent upon both the content storage requirements and the number of simultaneous streams of data supported by the system. Constant bit rate, isochronous intervals are used to distribute data from the media servers 106 and 108 through the seat electronics units to the passenger sets of seat peripherals. The data server 102, the media controller 104 and the media servers 106 and 108 are all coupled to an asynchronous transfer mode (ATM) network switch 116, preferably by fibre optic cables.

Detailed Description Paragraph Right (13):
The data server 102, media controller 104, media servers 106 and 108, system management unit 114, attendant control panel 110 and system interface unit 118 are all components of the headend control system 101. Together, these components provide centralized storage of content, control of content delivery, system code storage, data storage, aircraft system interfaces, attendant station functions, network administration, maintenance management, billing services, live audio/video distribution and overhead audio/video generation and control.

Detailed Description Paragraph Right (14):
Each of the zone bridge units 138 and 140 are coupled to the ATM switch 116, preferably by fibre optic cables. In addition, the zone bridge units 138 and 140 are coupled to one another, preferably by IEEE 1394 standard digital cables. Likewise, the zone bridge units 138 and 140 are coupled to a predetermined set of seat electronics units, preferably via an IEEE 1394 serial bus network. An IEEE 1394 serial bus network is therefore formed between the zone bridge units 138 and 140 and their respective seat electronics units for communicating with the system manager unit 114 and receiving data from the headend servers 100 through the ATM switch 116. Each zone bridge unit is coupled to the ATM switch 116 and to control multiple seat electronics units, including providing power and data to and from the seat electronics units. In the system of the preferred embodiment, each zone bridge unit is configured to control up to 50 seat electronics units. For illustration purposes, only a portion of the configuration of the zone bridge unit 140, relative to specific seat electronics units within its zone, is illustrated in FIG. 1. It should be readily understood, that the remaining zone bridge units within the system and the remaining seat electronic unit ports of the zone bridge unit 140 will include similar configurations.

Detailed Description Paragraph Right (16):
Each set of seat peripherals 150, 152, 154, 156 and 158 include a seat video display, a passenger control unit and a passenger control handset and together with the controlling seat electronics unit effectively implement a personal computer,

including internal memory, which receives content data based on the passenger's request, over the IEEE 1394 serial bus network. As will be described in detail below, communications between the seat electronics units, within this zone, and other components within the system are all transmitted using digital data through the ATM network switch 116 and the zone bridge unit 140. The seat electronics units then convert the digital data to analog data as necessary.

Detailed Description Paragraph Right (18):
The ATM switch unit 116 and the zone bridge units 138 and 140 together form a network distribution system 103. The network distribution system provides for and controls the delivery of data, such as stored content, code, application data, live content and control data, from the servers of the headend control system to the seat electronics units. The network distribution system also provides for and controls the delivery of data, such as, but not limited to, switch data, billing data and game data, from the seat electronics units to the servers of the headend control system. Between each of the components of the headend control system and the ATM switch 116, data is preferably transmitted in a digital format through fibre optic cables. Between each of the zone bridge units 138 and 140 and their respective seat electronics units 146 and 148, data is transmitted in a digital format through IEEE 1394 standard cables. Accordingly, an ATM network is formed between the components of the headend control system, the ATM switch 116 and the zone bridge units 138 and 140, while an IEEE 1394 serial bus network is formed between each zone bridge unit 138 and 140 and the seat electronics units to which it is coupled.

Detailed Description Paragraph Right (19):
Data transmitted from the headend control system to the seats is sent over the ATM network, through the ATM switch 116 to the proper zone bridge unit 138 and 140, where it is adapted to the IEEE 1394 format and delivered to the proper seat electronics unit over the IEEE 1394 serial bus. Data sent from the seat electronics units to one of the headend servers or to the system manager unit travels over the IEEE 1394 serial bus to the appropriate zone bridge unit where it is adapted to the ATM network, sent to the ATM switch 116 and routed to the proper headend server. The IEEE standard, "P1394 Standard For A High Performance Serial Bus," Draft 8.01v1, Jun. 16, 1995, is an international standard for implementing an inexpensive high-speed serial bus architecture which supports both asynchronous and isochronous format data transfers.

Detailed Description Paragraph Right (23):
The modifications necessary to upgrade the subsystem of FIG. 15A to a full video on demand system, according to the present invention, are illustrated in FIG. 15B. These modifications are shown outlined in solid lines, while the components already included within the subsystem are shown in dotted lines. Within the headend system 101, these modifications include the addition of one or more media server units 106 and 108, and the addition of control boards within the data server unit 102, and MPEG encoder and decoder boards within the system interface unit 118. Within the ATM switch unit 116, the addition of network module boards is also required. A zone bridge module must also be added to each zone bridge unit 138. Each passenger set of seat peripherals must be upgraded to include the display unit 1102 and the passenger control handset 1108. Each seat electronics unit must be upgraded to include a daughter board. With these modifications, a subsystem, as illustrated in FIG. 15A, can be upgraded to a full video on demand system, as illustrated in FIG. 15B.

Detailed Description Paragraph Right (25):
A detailed block diagram of the components within the media server units 106 and 108 is illustrated in FIG. 3. A preferred media server is the Microsoft Media Server, available from Microsoft of Redmond, Wash. A control processor 300 is coupled to a data bus 302 for controlling communications and providing instructions within the media server unit. The data bus 302 may be configured as a Peripheral Component Interconnect (PCI) bus, an Industry Standard Architecture (ISA) bus or any other appropriate type of data bus. The control processor 300 is also coupled to a system hard drive 306, an internal random access memory (RAM) 304 and a temperature sensor which includes a fan control circuit 310. The temperature sensor and fan control circuit 310 is coupled to one or more fans 312 for controlling the temperature within the media server unit. The data bus 302 is coupled to an ATM network adapter 308. The ATM network adapter 308 is coupled to the ATM switch 116 for communicating

over the ATM network with other components within the system. Preferably, the ATM network adapter 308 is coupled to the ATM switch 116 by an OC3 fibre optic cable. Alternatively, any appropriate link can be used to couple the ATM network adapter 308 and the ATM switch 116. The data bus 302 is also coupled to one or more content disk drive adapters 318. Each content disk drive adapter 318 is coupled to one or more content disk drives 320 for storing data in and obtaining data from each of the content disk drives 320. The content disk drives 320 store audio and video content data to be accessed through the seat electronics units. A 115 volt, 400 Hertz, AC power line and a power disable keyline control signal are coupled to a power supply control circuit 314. The temperature sensor and fan control circuit 310 is also coupled to the power supply control circuit 314. The power supply control circuit 314 is coupled to a power supply circuit 316. The power supply circuit 316 is coupled to the temperature sensor and fan control circuit 310 and to the data bus 302 for providing power to the circuits within the media server unit.

Detailed Description Paragraph Right (26):
A detailed block diagram of the components within the media controller server 104 and the data server 102 are illustrated in FIG. 4. Within the preferred embodiment of the present invention, the media controller server 104 and the data server 102 are implemented within a single line replaceable unit. The data server unit 102 includes a control processor 400 which is coupled to a data bus 402 for controlling communications and providing instructions within the data server unit 102. The control processor 400 is also coupled to an internal RAM 408 and a system hard drive 404. The system hard drive 404 is coupled to a mirror hard drive 406 for providing redundancy and backup data. The data bus 402 is also coupled to an ATM network adapter 410. The ATM network adapter 410 is coupled to the ATM switch 116 for communicating over the ATM network. Preferably, the ATM network adapter 410 is coupled to the ATM switch 116 by an OC3 fibre optic cable. Alternatively, any appropriate link can be used to couple the ATM network adapter 410 and the ATM switch 116.

Detailed Description Paragraph Right (27):
A control processor 420 is coupled to a data bus 422 for controlling communications and providing instructions within the media controller unit 104. The control processor 420 is also coupled to an internal RAM 428 and a system hard drive 424. The system hard drive 424 is coupled to a mirror hard drive 426 for providing redundancy and backup data. In addition, the data bus 422 is coupled to an ATM network adapter 430. The ATM network adapter 430 is coupled to the ATM switch 116 for communicating over the ATM network with other components within the system. Preferably, the ATM network adapter 430 is coupled to the ATM switch 116 by an OC3 fibre optic cable. Alternatively, any appropriate link can be used to coupled the ATM network adapter 430 and the ATM switch 116.

Detailed Description Paragraph Right (29):
A detailed block diagram of the components within the system manager unit 114 is illustrated in FIG. 5. A control processor 500 is coupled to a backplane 502 through a data bus 510 for controlling communications and providing instructions to the components within the system manager unit 114. A power supply circuit 504 is also coupled to the backplane 502 for providing power to the components within the system manager unit 114. A power control circuit 519 is coupled to the power supply 504 and to the control processor 500, through the printer port 518. The control processor 500 is coupled to an internal RAM 506, a system hard drive 508 and a floppy disk drive 512. The control processor 500 is also coupled to a keyboard 524, through a keyboard interface circuit 522, to a maintenance port 208, through a RS-232 interface 516, and to a touch screen panel in a display 536, through a RS-232 interface 514. The backplane 502 is also coupled to an ATM network interface 526 by a PCI bus 528. The system manager unit 114 is coupled to the ATM switch 116 through the ATM network interface 526 for communications over the ATM network. The backplane 502 is also coupled to an MPEG video graphics adapter (VGA) interface 530 by a PCI bus 532. The MPEG VGA interface 530 is coupled to the system interface unit 118 for receiving audio and video input from the system interface unit. The MPEG VGA interface 530 is also coupled to the display 536 and to a set of audio headphones, through a display, headphone interface circuit 534 for communicating with an attendant.

Detailed Description Paragraph Right (35):
A detailed block diagram of the system interface unit 118 is illustrated in FIG. 7. A control processor 700 including memory is coupled to both a PCI bus 724 and an ISA bus 726 for communicating with the other components within the system interface unit 118. A hard disk drive 702 is also coupled to the control processor 700. A keyline interface circuit 706 is coupled to the ISA bus 726 to receive and send keyline control signals. An ATM network interface 704 is coupled to the ATM switch 116 and to the PCI bus 724, thereby allowing the system interface unit 118 to communicate over the ATM network. A first audio/video multiplexer 712 is coupled to receive both video and audio data from one or more video cameras positioned on the aircraft, the passenger flight information system, one or more video reproducer units and television signals. The first audio/video multiplexer 712 is also coupled to an MPEG encoder circuit 714 and to the ISA bus 726. The MPEG encoder circuit 714 is coupled to the PCI bus 724. A second audio/video multiplexer 710 is coupled to provide video signals to the one or more smart video distribution units and audio signals to a multiplexed audio interface. The second audio/video multiplexer 710 is also coupled to receive public address system audio signals. The second audio/video multiplexer 710 is further coupled to the first audio/video multiplexer 712, to an MPEG decoder circuit 708 and to the ISA bus 726. The MPEG decoder circuit 708 is coupled to the PCI bus 724. A power control and power supply circuit 716 is coupled to receive power control keyline signals and to provide power to the components within the system interface unit 118. An elapsed time indicator circuit 718 is coupled to the power control and power supply circuit 716, to a display 720 and to the ISA bus 726. An RS-485 standard interface circuit 722 is coupled to communicate with the video reproduce units, cameras and smart video distribution units. The RS-485 standard interface circuit 722 is also coupled to the ISA bus 726. The interfaces that are discussed above are explanatory only, and are related to the new standard aircraft interface. It will be apparent to one of ordinary skill in the art that other appropriate interfaces could be included.

Detailed Description Paragraph Right (36):
A block diagram of the ATM switch circuit 116 is illustrated in FIG. 8. A switch backplane 800 is coupled to one or more switch control processors 802. Each switch control processor 802 is coupled to one or more network modules 808, which each include multiple ATM network ports through which communications are transmitted and received. Each ATM port interfaces with an ATM network interface within a component of the system for directing communications over the ATM network. Each network module 808 preferably includes four ATM ports. The switch control processor 802 is also coupled to an RS-232 serial port 804. Alternatively, each switch control processor 802 is coupled to an ethernet port 806. A power control keyline signal is coupled to a power control circuit 812. The power control circuit 812 is coupled to a dual redundant power supply circuit 810. The power supply circuit 810 is coupled to receive a 115 volt AC, 400 Hertz, power line signal. The power supply circuit 810 is also coupled to the switch backplane circuit 800 for providing power to the components within the ATM switch circuit 116. A preferred ATM switch is available from Fore Systems of Warrendale, Pennsylvania. Alternatively, any appropriate ATM switch can be implemented.

Detailed Description Paragraph Right (37):
The ATM switch 116 is the in-flight entertainment system's central switching fabric for the headend control system's ATM network. The ATM switch 116 is used for data switching between the components of the headend control system and the zone bridge units. The ATM switch 116 is also used for switch call processing and switch maintenance processing. The ATM switch 116 further provides power supply redundancy through the dual redundant power supply circuit 810.

Detailed Description Paragraph Right (38):
A block diagram of a zone bridge unit is illustrated in FIG. 9. An optical receiver link 902 is coupled to the ATM network for communicating over the network. Preferably, the optical receiver link 902 is coupled to the ATM network by an OC3 fibre optic cable. Alternatively, any appropriate link can be used to couple the optical receiver link 902 to the ATM network. The optical receiver link 902 is coupled to an ATM segmentation and reassembly (SAR) device 904. The ATM SAR 904 is coupled to a control processor 906, to a memory circuit 908 and to a network link circuit 910 for communicating between the ATM network and the seat network. The

network link circuit 910 is coupled to the seat network through a physical interface circuit 912 and for sending data to and receiving data from the seat electronic units within the zone. Overhead audio data is provided to the seat network through a buffer 914 within the zone bridge unit. A universal asynchronous receiver transmitter (UART) 916 is coupled to the passenger service system. The UART 916 is coupled to a control processor 920, to a memory circuit 922, to a digital signal processor 924 and to a buffer 918 for controlling communications between the passenger service system and the seat network. The buffer 918 is coupled to a combining circuit 926. Preferably, a CEPT-E1 standard circuit 930 is coupled to the aircraft's telephone system. The CEPT-E1 circuit 930 is coupled to the digital signal processor 924 and to a buffer 928 for controlling telephone communications from within the zone. Alternatively, any appropriate telecommunications link can be coupled to the aircraft's telephone system. The buffer 928 is coupled to the combining circuit 926. The combining circuit 926 is coupled to the seat network for controlling communications to and from the aircraft's passenger service system and telephone system.

Detailed Description Paragraph Right (40):
Each of the zone bridge units bridge the high speed, fibre optic ATM network at the headend of the system to the IEEE 1394 serial bus seat distribution network for a particular zone within the aircraft. The zone bridge unit is responsible for managing the IEEE 1394 seat distribution network for a zone within the aircraft including the functions of IEEE 1394 bus management and IEEE 1394 bandwidth resource management. The zone bridge unit is further responsible for mapping IEEE 1394 addressing to ATM addressing as well as supporting broadcast and multicast functionality between the ATM network and the IEEE 1394 seat distribution network.

Detailed Description Paragraph Right (43):
The seat video display 1102 provides the passenger with an LCD display for viewing personal entertainment data and information service data at their seat. Preferably, the seat video display 1102 is housed within a stowable seat display arm which is rotated out when in use and stored within an arm rest when not in use. Alternatively, the seat video display 1102 is located within the seatback or bulkhead in front of the passenger's seat. The viewing angle, high brightness and high contrast are characteristics which can be adjusted by a user in the preferred embodiment of the seat video display 1102. The data received by the seat electronics unit 1100, over the IEEE 1394 bus, is received in a digital format. Accordingly, the seat electronics unit 1100 includes one or more digital-to-analog converter circuits for converting the received digital data stream, representing the video and audio, to an analog data stream before it is transmitted to either the display 1102 or the headset 1106. While preferably the display is an LCD, other types of relatively light weight and relatively high brightness and definition displays are acceptable for use with the present invention, including, for example, goggle-type LCD displays such GLASTRON.TM. sold by Sony Corporation, Tokyo Japan. Also, while a conventional audio headset is preferred for use as the headset 1106, the audio headset 1106 can alternatively be a noise cancelling headset which includes a power connection to the headset in addition to the audio connection.

Detailed Description Paragraph Right (45):
The system configuration data includes specific cabin management data, expected system configuration, flight information data and billing system inputs. The specific cabin management data includes the data related to the overhead video selection and audio channel assignments, zone programming assignment and aircraft seat class assignment for the flight. The cabin management data also includes the data relating to customer menus and languages, including a greeting menu which is displayed with the airline's colors and logo. Alternatively, the cabin management data will also include the data for inventory management of meals, drinks and duty free items, as well as system usage statistics.

Detailed Description Paragraph Right (46):
The expected system configuration data includes the data related to the specific hardware and software in use within the aircraft and the configuration of the hardware, including the number of seats, seat boxes, zones, servers and attendant stations and the specific seat arrangement. The flight information data contains the data on the passengers, including the passenger's names, where each passenger is

sitting, their frequent flyer number, whether or not they are flying with a group and their pre-authorized spending account balances on the in-flight entertainment system. The billing system inputs include data on the billing system rates, currency exchange rates for international flights, prices of each product and service, list of free products and services and packages of products and services, an encrypted table of invalid credit card numbers and a list of statistics to be collected on use of the system during the flight.

Detailed Description Paragraph Right (48):
A block diagram showing the audio distribution paths of the entertainment system of the present invention is illustrated in FIG. 12. The first audio distribution path 1220 is routed from the ATM network switch 116 to the headend servers 100 and to each of the zone bridge units 138, 140 and 1200. The second audio distribution path is routed from the system interface unit 118 to each of the zone bridge units 138, 140 and 1200. The first and second audio paths are then routed from the zone bridge units 138, 140 and 1200 to each seat electronics unit within the respective zones.

Detailed Description Paragraph Right (52):
As described above, an IEEE 1394 network is formed between the zone bridge units and the seat electronics units for the communication of data within the zone. The IEEE standard, "P1394 Standard For A High Performance Serial Bus," Draft 8.01v1, Jun. 16, 1995, is an international standard for implementing an inexpensive high-speed serial bus architecture which supports both asynchronous and isochronous format data transfers. Isochronous data transfers are real-time transfers which take place such that the time intervals between significant instances have the same duration at both the transmitting and receiving applications. Each packet of data transferred isochronously is transferred in its own time period. The IEEE 1394 standard bus architecture provides multiple channels for isochronous data transfer between applications. A six bit channel number is broadcast with the data to ensure reception by the appropriate application. This allows multiple applications to simultaneously transmit isochronous data across the bus structure. Asynchronous transfers are traditional data transfer operations which take place as soon as possible and transfer an amount of data from a source to a destination.

Detailed Description Paragraph Right (54):
The in-flight entertainment system of the present invention provides both multicast and broadcast distribution of data to the seat electronics units in addition to the individualized streams of data supporting the video and audio on demand features. Multicast distribution of data is used to deliver common data, such as video from the observation camera or data from the passenger flight information system, to only those passengers who wish to receive it. Broadcast distribution of data is used to deliver public address announcement audio data and video content such as the safety video simultaneously to all of the seats. The broadcast data has priority over any other transfer of data on the network.

Detailed Description Paragraph Right (55):
When transmitting the broadcast data, especially the safety video, it is important that all of the passengers within the aircraft receive the data stream simultaneously, in order that the video viewed by each passenger is synchronized to any live demonstrations by the flight attendants. Using the ATM network and the ATM switch 116, data broadcast through the ATM switch 116 is synchronized by setting up a multipoint to multipoint connection through the ATM switch 116. The ATM switch 116 combines the time multiplexed data stream coming in on several input ports of the distributed servers within the headend. The ATM switch 116 then copies the data to each output port coupled to a zone bridge unit. Thus, each zone bridge unit only receives a single copy of the broadcast data stream. The broadcast data stream passes through the zone bridge unit which routes the data to the seat network. The IEEE 1394 seat network then broadcasts this stream of data to each seat on each seat column output of the zone bridge unit. This secondary broadcast from the zone bridge unit uses a point to multipoint broadcast connection technique, with each seat electronics unit only seeing one copy of the data stream. This technique eliminates network bottlenecks and allows the server to broadcast a single data stream over an ATM network to all of the seat electronics units in synchronization. The few copies of the data stream within the network avoids flooding the network with stream copies guaranteeing a low distribution latency for the system. Using this multipoint to

multipoint virtual channel connection between the headend servers and the seat electronics units, the entire aircraft can receive the same data stream in synchronization.

Detailed Description Paragraph Right (58):
To play a video or audio program, a passenger makes a selection at their passenger set of seat peripherals. This program request initiates a call setup to the media controller 104. The media controller 104 then schedules the program to be played with the media servers 106 and 108. A program connection to the passenger's set of seat peripherals consists of three virtual channels: one channel is used for transmission of the data stream; another channel is kept open for the transmission of control signals; and a third channel is kept open for ATM network management signals. The content data is read from the media servers 106 and 108 and sent to the ATM switch 116. At the ATM switch 116, the content data arrives on different ports from each media server. The ATM switch 116 then performs a multipoint to point recombination of the content data, thereby creating a single in-sequence data stream which is addressed to the passenger's seat electronics unit.

Detailed Description Paragraph Right (59):
Content data streams for each seat electronics unit coupled to a zone bridge unit are sent from the ATM switch 116 to the zone bridge unit on a single ATM port, using multiple channels. At the zone bridge unit, the ATM cells for each seat electronics unit are reassembled and segmented into IEEE 1394 packets. The IEEE 1394 packets are then appended with the appropriate destination header and transmitted over the IEEE 1394 network to the appropriate seat electronics unit. At the seat electronics unit, the data is reassembled from the IEEE 1394 packets and sent to the applications within the appropriate passengers set of seat peripherals where the data is extracted from the headers and sent to the MPEG decoder for display.

Detailed Description Paragraph Right (66):
The in-flight entertainment system of the present invention will pause all video, audio, game and information services during a cabin wide announcement over the public address system. The system will issue public address override signals upon detection of a public address condition. The system interface unit 118 provides indication of the public address override condition to the seat electronics units and to the attendant control panel 110 within the effected zones via the ATM and IEEE 1394 networks, as well as via the second audio path. The seat electronics units will override entertainment audio with public address audio upon receiving a public address override command.

Detailed Description Paragraph Right (68):
The present invention has been described in terms of specific embodiments incorporating details to facilitate the understanding of principles of construction and operation of the invention. Such reference herein to specific embodiments and details thereof is not intended to limit the scope of the claims appended hereto. It will be apparent to those skilled in the art that modifications may be made in the embodiment chosen for illustration without departing from the spirit and scope of the invention. For example, while an ATM network and IEEE 1394 serial bus network have been chosen for use in the preferred embodiment, it will be apparent that other types of networks could alternatively be used for communications between the components of the in-flight entertainment system of the present invention. It will also be apparent that the entertainment system of the present invention can also be readily adapted for operation in environments other than aircraft, including but not limited to other transportation modes, e.g. train, bus, ferry and cruise ship.

Other Reference Publication (16):
"The network connection announces Hiper Cheetah--300 simultaneous video streams," PR Newswire, Jun. 7, 1996.

Other Reference Publication (31):
"AirView," product brochure, The Network Connection, Inc.

CLAIMS:

4. The audio distribution system as claimed in claim 3 wherein the media servers,

the system interface unit and the routing device are coupled together within a first digital network and the zone bridge units and the control sets are coupled together within a second digital network.

5. The audio distribution system as claimed in claim 4 wherein the first digital network is an ATM network and the second digital network is an IEEE 1394 serial bus network.

12. The in-flight entertainment system as claimed in claim 11 wherein the media servers, the system interface unit and the routing device are coupled together within a first digital network and the zone bridge units and the output units are coupled together within a second digital network.

13. The in-flight entertainment system as claimed in claim 12 wherein the first digital network is an ATM network and the second digital network is an IEEE 1394 serial bus network.

14. The in-flight entertainment system as claimed in claim 13 further comprising a media controller coupled to the first digital network for controlling and scheduling communications from the first digital network to the second digital network.

15. The in-flight entertainment system as claimed in claim 14 wherein each control set includes a digital to analog conversion circuit for converting communications received over the second digital network to analog signals, as necessary for appropriately controlling operation of the display and audio output.

19. A passenger audio distribution system for distributing audio content to one or more passengers on an aircraft, comprising:

a. a first means for storing audio content;

b. a plurality of means for accessing audio content, each for use by passengers for accessing the audio content, the plurality of means for accessing audio content coupled within a first network;

c. first means for routing audio content coupled to the first means for storing audio content within a second network, and to a first predetermined number of the plurality of means for accessing audio content for routing audio content between the first means for storing audio content and the first predetermined number of the plurality of means for accessing audio content, over the first and second networks, thereby forming a first audio path for routing audio content from the first means for storing audio content to the first predetermined number of the plurality of means for accessing audio content; and

d. second means for routing audio content coupled to the plurality of means for accessing audio content and to a means for addressing passengers, thereby forming a second audio path for routing audio content from the second means for routing audio content to the plurality of means for accessing audio content.

23. The passenger audio distribution system as claimed in claim 22 wherein the first means for storing audio content, the system interface unit and the first means for routing audio content are coupled together within a first digital network and the zone bridge units and the means for accessing audio content are coupled together within a second digital network.

24. The passenger audio distribution system as claimed in claim 23 wherein the first digital network is an ATM network and the second digital network is an IEEE 1394 serial bus network.

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L9: Entry 2 of 4 File: USPT Oct 26, 1999

DOCUMENT-IDENTIFIER: US 5973722 A
TITLE: Combined digital audio/video on demand and broadcast distribution system

Brief Summary Paragraph Right (1):
The present invention relates to the field of audio and video on demand entertainment systems. More particularly, the present invention relates to the field of distributed network video on demand entertainment and broadcast distribution systems for use onboard an aircraft during flight.

Brief Summary Paragraph Right (6):
Another video on demand in-flight entertainment system has been developed by B/E Aerospace of Irvine, Calif. This system is advertised to provide a passenger with over 500 channels for regular video programming such as movies, as well as live broadcast television and a variety of interactive features such as video games. This system also provides duty free and catalog shopping, information menus, and both ground-base and satellite in-cabin telephone distribution through an individual video on demand module at the passenger's seat. The control electronics for this system are installed in a former galley unit on the aircraft which has been retrofitted to house the video on demand system. The control electronics are then coupled to each individual video on demand module throughout the cabin by a star network, with separate data wires running between each individual module and the control electronics.

Brief Summary Paragraph Right (8):
What is needed is a video on demand in-flight entertainment system which is fully interactive and can provide multiple features to a passenger through an individual module. What is further needed is a video on demand in-flight entertainment system which uses complete end-to-end digital delivery from the control system to the passenger seat units and also includes an overhead broadcast system. What is still further needed is a video on demand in-flight entertainment system which provides all entertainment features on demand to all passengers having access to a passenger seat unit at all authorized times. Additionally, what is needed is an in-flight entertainment system which incorporates a serial network and is therefore lighter, easier to maintain and easier to reconfigure than existing systems. What is also needed is an in-flight entertainment system which includes separate and redundant systems allowing a portion of the system to fail without rendering the entire system nonoperational.

Drawing Description Paragraph Right (1):
FIG. 1 illustrates a system block diagram of a digital video on demand and backup broadcast distribution system of the present invention.

Detailed Description Paragraph Right (5):
A system block diagram of an in-flight entertainment system including a digital video on demand and backup broadcast distribution system of the present invention is illustrated in FIG. 1. Headend servers 100 of the system include a data server 102, a media controller 104 and multiple media servers 106 and 108. The data server 102 includes a hard disk drive which stores and transmits data necessary for playing video games at a passenger's seat electronics unit and also maintains the data and statistics related to the amount of money and time spent on different features at each individual passenger seat.

Detailed Description Paragraph Right (10):

A system interface unit 118 is also coupled to the ATM switch 116, preferably by a fibre optic cable. The system interface unit 118 is coupled to the aircraft's conventional entertainment system and drives the overhead display system including overhead video monitors and audio system, as will be described below. This overhead audio system a public address (PA) audio system. The system interface unit 118 and the overhead video monitors and audio system together provide an alternate and backup broadcast system which allows the airline flexibility in the design of the interior of the airplane's cabin and a backup system in the event of a failure of the video on demand entertainment system. The system interface unit 118 is coupled to an audio reproducer unit 120, which preferably includes a compact disk player with multiple compact disks containing audio data. The system interface unit 118 is also coupled to one or more video reproducer units 122, which each preferably include a video cassette player and the ability to output video content from inserted video cassettes. The video reproducer units 122 could also include one or more video disk players.

Detailed Description Paragraph Right (35):
A detailed block diagram of the system interface unit 118 is illustrated in FIG. 7. A control processor 700 including memory is coupled to both a PCI bus 724 and an ISA bus 726 for communicating with the other components within the system interface unit 118. A hard disk drive 702 is also coupled to the control processor 700. A keyline interface circuit 706 is coupled to the ISA bus 726 to receive and send keyline control signals. An ATM network interface 704 is coupled to the ATM switch 116 and to the PCI bus 724, thereby allowing the system interface unit 118 to communicate over the ATM network. A first audio/video multiplexer 712 is coupled to receive both video and audio data from one or more video cameras positioned on the aircraft, the passenger flight information system, one or more video reproducer units and television signals. The first audio/video multiplexer 712 is also coupled to an MPEG encoder circuit 714 and to the ISA bus 726. The MPEG encoder circuit 714 is coupled to the PCI bus 724. A second audio/video multiplexer 710 is coupled to provide video signals to the one or more smart video distribution units and audio signals to a multiplexed audio interface. The second audio/video multiplexer 710 is also coupled to receive public address system audio signals. The second audio/video multiplexer 710 is further coupled to the first audio/video multiplexer 712, to an MPEG decoder circuit 708 and to the ISA bus 726. The MPEG decoder circuit 708 is coupled to the PCI bus 724. A power control and power supply circuit 716 is coupled to receive power control keyline signals and to provide power to the components within the system interface unit 118. An elapsed time indicator circuit 718 is coupled to the power control and power supply circuit 716, to a display 720 and to the ISA bus 726. An RS-485 standard interface circuit 722 is coupled to communicate with the video reproduce units, cameras and smart video distribution units. The RS-485 standard interface circuit 722 is also coupled to the ISA bus 726. The interfaces that are discussed above are explanatory only, and are related to the new standard aircraft interface. It will be apparent to one of ordinary skill in the art that other appropriate interfaces could be included.

Detailed Description Paragraph Right (40):
Each of the zone bridge units bridge the high speed, fibre optic ATM network at the headend of the system to the IEEE 1394 serial bus seat distribution network for a particular zone within the aircraft. The zone bridge unit is responsible for managing the IEEE 1394 seat distribution network for a zone within the aircraft including the functions of IEEE 1394 bus management and IEEE 1394 bandwidth resource management. The zone bridge unit is further responsible for mapping IEEE 1394 addressing to ATM addressing as well as supporting broadcast and multicast functionality between the ATM network and the IEEE 1394 seat distribution network.

Detailed Description Paragraph Right (43):
The seat video display 1102 provides the passenger with an LCD display for viewing personal entertainment data and information service data at their seat. Preferably, the seat video display 1102 is housed within a stowable seat display arm which is rotated out when in use and stored within an arm rest when not in use. Alternatively, the seat video display 1102 is located within the seatback or bulkhead in front of the passenger's seat. The viewing angle, high brightness and high contrast are characteristics which can be adjusted by a user in the preferred embodiment of the seat video display 1102. The data received by the seat electronics

unit 1100, over the IEEE 1394 bus, is received in a digital format. Accordingly, the seat electronics unit 1100 includes one or more digital-to-analog converter circuits for converting the received digital data stream, representing the video and audio, to an analog data stream before it is transmitted to either the display 1102 or the headset 1106. While preferably the display is an LCD, other types of relatively light weight and relatively high brightness and definition displays are acceptable for use with the present invention, including, for example, goggle-type LCD displays such GLASTRON.TM. sold by Sony Corporation, Tokyo Japan. Also, while a conventional audio headset is preferred for use as the headset 1106, the audio headset 1106 can alternatively be a noise cancelling headset which includes a power connection to the headset in addition to the audio connection.

Detailed Description Paragraph Right (45):
The system configuration data includes specific cabin management data, expected system configuration, flight information data and billing system inputs. The specific cabin management data includes the data related to the overhead video selection and audio channel assignments, zone programming assignment and aircraft seat class assignment for the flight. The cabin management data also includes the data relating to customer menus and languages, including a greeting menu which is displayed with the airline's colors and logo. Alternatively, the cabin management data will also include the data for inventory management of meals, drinks and duty free items, as well as system usage statistics.

Detailed Description Paragraph Right (46):
The expected system configuration data includes the data related to the specific hardware and software in use within the aircraft and the configuration of the hardware, including the number of seats, seat boxes, zones, servers and attendant stations and the specific seat arrangement. The flight information data contains the data on the passengers, including the passenger's names, where each passenger is sitting, their frequent flyer number, whether or not they are flying with a group and their pre-authorized spending account balances on the in-flight entertainment system. The billing system inputs include data on the billing system rates, currency exchange rates for international flights, prices of each product and service, list of free products and services and packages of products and services, an encrypted table of invalid credit card numbers and a list of statistics to be collected on use of the system during the flight.

Detailed Description Paragraph Right (52):
As described above, an IEEE 1394 network is formed between the zone bridge units and the seat electronics units for the communication of data within the zone. The IEEE standard, "P1394 Standard For A High Performance Serial Bus," Draft 8.01v1, Jun. 16, 1995, is an international standard for implementing an inexpensive high-speed serial bus architecture which supports both asynchronous and isochronous format data transfers. Isochronous data transfers are real-time transfers which take place such that the time intervals between significant instances have the same duration at both the transmitting and receiving applications. Each packet of data transferred isochronously is transferred in its own time period. The IEEE 1394 standard bus architecture provides multiple channels for isochronous data transfer between applications. A six bit channel number is broadcast with the data to ensure reception by the appropriate application. This allows multiple applications to simultaneously transmit isochronous data across the bus structure. Asynchronous transfers are traditional data transfer operations which take place as soon as possible and transfer an amount of data from a source to a destination.

Detailed Description Paragraph Right (54):
The in-flight entertainment system of the present invention provides both multicast and broadcast distribution of data to the seat electronics units in addition to the individualized streams of data supporting the video and audio on demand features. Multicast distribution of data is used to deliver common data, such as video from the observation camera or data from the passenger flight information system, to only those passengers who wish to receive it. Broadcast distribution of data is used to deliver public address announcement audio data and video content such as the safety video simultaneously to all of the seats. The broadcast data has priority over any other transfer of data on the network.

Detailed Description Paragraph Right (55):
When transmitting the broadcast data, especially the safety video, it is important that all of the passengers within the aircraft receive the data stream simultaneously, in order that the video viewed by each passenger is synchronized to any live demonstrations by the flight attendants. Using the ATM network and the ATM switch 116, data broadcast through the ATM switch 116 is synchronized by setting up a multipoint to multipoint connection through the ATM switch 116. The ATM switch 116 combines the time multiplexed data stream coming in on several input ports of the distributed servers within the headend. The ATM switch 116 then copies the data to each output port coupled to a zone bridge unit. Thus, each zone bridge unit only receives a single copy of the broadcast data stream. The broadcast data stream passes through the zone bridge unit which routes the data to the seat network. The IEEE 1394 seat network then broadcasts this stream of data to each seat on each seat column output of the zone bridge unit. This secondary broadcast from the zone bridge unit uses a point to multipoint broadcast connection technique, with each seat electronics unit only seeing one copy of the data stream. This technique eliminates network bottlenecks and allows the server to broadcast a single data stream over an ATM network to all of the seat electronics units in synchronization. The few copies of the data stream within the network avoids flooding the network with stream copies guaranteeing a low distribution latency for the system. Using this multipoint to multipoint virtual channel connection between the headend servers and the seat electronics units, the entire aircraft can receive the same data stream in synchronization.

Detailed Description Paragraph Right (64):
Each smart video display unit group distributes three independent video channels for a total of six videos per system. Video channels are assigned to a specific aircraft zone. Each smart video display unit is instructed which video channel is selected for each display via the RS-485 interface. The system interface unit 118 has a video multiplexer circuit for each of the three outputs. The multiplexer inputs are two video tape recorder channels, one camera channel, one airshow channel, one spare input and a digital video channel. The audio data corresponding to the overhead video data is broadcast for distribution to the passengers at the seats through the audio distribution system, as described above. This audio data is broadcast through the second audio path, from the system interface unit 118 through the zone bridge units 138, 140 and 1200 and then to the seat electronics units. The passengers ultimately receive this audio data from the second audio path, through a set of headphones.

Other Reference Publication (21):
"Direct Broadcast Satellite TV for Airborne Applications," Hughes-Avicom International, Inc., 1996.

Other Reference Publication (22):
"Hughes-Avicom takes television airborne--featuring live satellite broadcast on board Delta Air Lines' Spirit of Delta B767 aircraft," Hughes-Avicom International product brochure, 1996.

Other Reference Publication (23):
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